

SAFRONOV, N.Ya.; BERESTNEVA, Z.Ya.; KARGIN, V.A.

Thermal decomposition of benzene and heptane on an incandesced  
molybdenum wire. Koll. zhur. 25 no.4:468-471 J1-Ag '63.  
(MIRA 17:2)

1. Fiziko-khimicheskiy institut imeni Karpova i Nauchno-  
issledovatel'skiy institut shinnoy promyshlennosti, Moskva.

15.8500

45157

AUTHORS:

Vinogradov, G. V., Belkin, I. M., Kargin, V. A., Academician

S/020/63/148/002/032/037  
B192/B101

TITLE:

High elasticity, shear strength and development of a stationary  
viscous flow in flowing polymers

PERIODICAL:

Akademiya nauk SSSR. Doklady, v. 148, no. 2, 1963, 369 - 372

TEXT: The transition from elastic deformation to the development of a stationary viscous flow in polymers was investigated on the substances Alkathene-2 (polyethylene) and block-polystyrene. With a rotary diffraction viscosimeter the shear stress  $\tau$  as a function of the deformation rates  $\dot{\gamma}$ . Calibration curves  $\tau(\dot{\gamma})$  at 114, 140 and 195°C with  $\dot{\gamma}$  values from 0.028 to 21 sec<sup>-1</sup> are given for polyethylene. For all selected temperatures the curves at low  $\dot{\gamma}$  first rose monotonically with  $\dot{\gamma}$  and then levelled to a constant value; but, for higher  $\dot{\gamma}$  values they rapidly rose to a maximum and then dropped monotonically to a constant value. For the deformation  $\dot{\gamma}_s$ , where  $\tau$  turns constant, there holds:  $\dot{\gamma}_s = A + B \log \dot{\gamma}$ , B being about

Card 1/2

High elasticity, shear ...

S/020/63/148/002/032/037  
B192/B101

2 for all temperatures, and  $\lambda$  decreasing with rising temperature. For monotonic curves the transition from the solid state to the development of a stationary flow occurs without a change in structure, for curves with a maximum, a change in structure takes place when passing the maximum. The good reproducibility of the calibration curve when the experiments are repeated, as well as the fact of the energy of activation being almost the same both at the limit of resistance and when the flow becomes stationary, lead to the conclusion that the change in structure is reversible and unattended by any destruction of the macromolecules. The modulus of rigidity  $G$  was ascertained from the rise of the curves  $\tau(\dot{\gamma})$  at  $\dot{\gamma} = 0$ . For small  $\dot{\gamma}$ , there resulted the functionality  $G = a + b \cdot \log \dot{\gamma}$ , where  $b = 4$  for polyethylene in the temperature range investigated,  $b = 8$  for polystyrene at  $160^\circ\text{C}$ ,  $b = 2.5$  at  $210^\circ\text{C}$ . With rising  $\dot{\gamma}$ ,  $G(\dot{\gamma})$  makes a distinct kink for the value of  $\dot{\gamma}_m$ , corresponding to a maximum appears in the curves  $\tau(\dot{\gamma})$ , and turns constant where the substance enters the field of high elasticity. There are 4 figures.

SUBMITTED: June 12, 1962

Card 2/2

KOZLOV, P.V.; TIMOFEYEVA, V.G.; KARGIN, V.A., akademik

Effect of low molecular weight substances sorbed by super-molecular structures on the mechanical properties of rigid-chain polymers. Dokl.AN SSSR 148 no.4:886-889 F '63. (MIRA 16:4)

1. Moskovskiy gosudarstvennyy universitet im. M.V.Lomonosova i  
Vsesoyuznyy nauchno-issledovatel'skiy kinofotoinstitut.  
(Polymers) (Chemical structure)

S/020/63/149/002/026/028  
B101/B144

AUTHORS: Kargin, V. A., Academician, Koretskaya, T. A., Bogayevskaya, T. A.

TITLE: Transition of flat structures of isotactic polystyrene into spherulithes

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 149, no. 2, 1963, 370

TEXT: Amorphous isotactic polystyrene was applied from toluene or xylene solution at 110°C to a film support. Examination with the electron microscope showed that amorphous particles of different shape had formed. Furthermore, intensive structural changes were observed on heating at 140 - 180°C in solid state. Nuclei of spherulithe formation occur. In crystallized polystyrene, initially laminated crystals form which grow by the helical mechanism analogously to polyethylene and paraffin. Then the edge of the faces doubles, and folds are formed from which fibrils and spherulithes arise.

ASSOCIATION: Fiziko-khimicheskiy institut im. L. Ya. Karpova (Physico-chemical Institute imeni L. Ya. Karpov)

~~Card 4/2~~

L 12963-63 EPR/EWP(j)/EPP(c)/EWT(m)/BDS ASD P-4/Pc-4/Pr-4 EM/WW  
 ACCESSION NR: AP3000520 S/0020/63/150/002/0331/0332 70

AUTHOR: Andrianova, G. P.; Bakeyev, N. F.; Kargin, V. A. (Academician) 69

TITLE: Influence of the microscopic structures on the mechanical behavior of  
 crystal polypropylene

SOURCE: AN SSSR. Doklady, v. 150, no. 2, 1963, 331-332

TOPIC TAGS: crystal polypropylene, Schopper machine, isotatic polypropylene,  
 fine spherulites, polymers

ABSTRACT: The present work is based on earlier investigations by the authors  
 (V. A. Kargin, G. P. Andrianova, DAN, 146, no. 6, 1337, 1962 and V. A. Kargin,  
 G. P. Andrianova, DAN, 139, no. 4, 874, 1961) on the structures of polypropylene.  
 Coatings of a thickness from 30 to 130 microns were prepared by pressing at fusion  
 temperature of 230C, and different cooling rates (from 5 to 0.2C per min). Tensile  
 tests were made at room temperature with Schopper machine (East German manufacture)  
 provided with a device which automatically draws a stress-strain diagram on speci-  
 mens with 3.2 mm width and 5 mm gage length, with speed of 2 mm per minute. Coatings  
 with fine spherulites (up to 30 micron diameter) had elongation up to 600%, coatings  
 with bigger spherulites (diameter from 40 to 60 microns) had up to 300% elongation,  
 and with a diameter from 250 to 400 microns the elongation was 7-10% respectively.  
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L 12983-63

ACCESSION NR: AP3000520

The authors conclude that size and "morphology" of the crystal structure shows an essential influence for deformation ability of isotactic polypropylene. Changes of the micro-structure of the polymer will change the mechanical properties. Orig. art. has: 1 figure.

ASSOCIATION: Institut neftekhimicheskogo sinteza Akademii nauk SSSR  
(Institute of Petrochemical Synthesis, Academy of Sciences SSSR)

SUBMITTED: 16Jan63

DATE ACQ: 12Jun63

ENCL: 00

SUB CODE: PH, CH

NO REF SOV: 003

OTHER: 003

Card 2/2

L 10832-63

EPR/EPF(c)/EWP(j)/EWT(m)/BDS--ASD--Pr-4/Fs-4/Pc-4--RM/WW

ACCESSION NR: AP3000752

S/0020/63/150/003/0574/3577

73  
72

AUTHOR: Vinogradov, G. V.; Malkin, A. Ya.; Prozorovskaya, N. V.; Kargin, V. A.,  
Member of Academy of Sciences

TITLE: Rheology of polymers. Temperature-invariant characteristic of anomalous-viscous systems

SOURCE: AN SSSR. Doklady, v. 150, no. 3, 1963, 574-577

TOPIC TAGS: rheology of polymers, temperature-invariant, viscosity, high pressure polyethylene, alkatene 2 block polystyrene, isotactic polypropylene, Newtonian viscosity, rate of deformation

ABSTRACT: The viscosity of high pressure polyethylene, alkatene 2, block poly-styrene and isotactic polypropylene was determined in a wide range of temperatures. This data, i.e., Newtonian viscosity  $\eta$  and the rate of deformation  $D$  at different temperatures, was plotted using logarithmic coordinates. When the Newtonian viscosity was plotted against temperature  $T$ , an invariant curve was obtained for each polymer. This method can prove useful for determining viscosity values in a greater range of  $D$  rates than can be obtained experimentally: all that is required experimentally is data for one  $T$  curve and the  $\eta$  at 3 or 4

Card 1/2

L 10832-63

ACCESSION NR: AP3000752

temperatures so that the temperature-invariant curve can be drawn. Orig. art. has:  
4 figures and 2 equations.

ASSOCIATION: Institut neftekhimicheskogo sinteza Akademii nauk SSSR (Institute of  
Petrochemical Synthesis, Academy of Sciences SSSR)

SUBMITTED: 07Jan63

DATE ACQD: 21Jun63

ENCL: 00

SUB CODE: 00

NO REF SOV: 003

OTHER: 006

ch/ew  
Card 2/2

L 12630-63

EMP(j)/EPF(c)/EWT(m)/BDS

ASD

Pc-4/Pr-4

RM/WW

ACCESSION NR: AP3002879

S/0020/63/150/005/1073/1076

AUTHOR: Kabanov, V. A.; Kargin, V. A.

TITLE: Autocatalysis in polymerization reaction

SOURCE: AN SSSR. Doklady\*, v. 150, no. 5, 1963, 1073-1076

TOPIC TAGS: autocatalysis, polymerization reaction, diffusion, jelly-effect, autocatalytic acceleration, growth rate, autocatalytic polymerization

ABSTRACT: Acceleration of polymerization reactions during accumulation of polymer in a system usually is connected with a decrease of constant of the rate of kinetic chain breaking, as a function of the difficulty of diffusion of active polymer nuclei as influenced by increase in viscosity of the medium (jelly-effect). There are other possibilities for autocatalytic acceleration, combined, for example, with an increase of chain growth rate constant if the active nucleus appears in contact with already prepared macromolecule or an aggregate of macromolecules. There is interest in the study of autocatalytic polymerization exhibited by systems for which breaking reactions are not combined with collisions of two macroradicals, since it is difficult to isolate the matrix effect from the jelly-effect. Equations for propagation, chain growth, and chain breaking are given as a simple kinetic schematic of autocatalysis polymerization. "In

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I 12630-63

ACCESSION NR: AP3002879

conclusion, the authors express gratitude to M. S. Yenikolopyan for his discussion of the work". Orig. art. has: 4 figures and 2 formulas. 2

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova  
(Moscow State University)

SUBMITTED: 15Feb63

DATE ACQ: 15Jul63

ENCL: 00

SUB CODE: 00

NO REF SOV: 003

OTHER: 003

MCS/SL  
Card 2/2

L 14201-63

EPR/EWP(j)/EPF(c)/EWT(m)/BDS AFFTC/ASD PS-4/PC-4/PR-4

RM/WW

ACCESSION NR: AP3004432

8/0020/63/151/004/0898/0901

72

AUTHOR: Shtarkman, B. P.; Voyutskiy, S. S.; Kargin, V. A. (Academician)

TITLE: On the molecular mechanism of the autohesion of polymers with an ordered structure

SOURCE: AN BSSR. Doklady\*, v. 151, no. 4, 1963, 898-901

TOPIC TAGS: autohesion, polymer, supermolecular structure, diffusion adhesion theory, adhesive bond, polyethylene, poly(vinyl chloride), dibutyl sebacate, stripping test, adhesion work, glass-transition temperature, ordered structure, autohesion mechanism, contact layer, polymer structure, single crystal, band, bundle, macromolecular bundle, macromolecule mobility, supermolecular-structure stability

ABSTRACT: The autohesion of polymers with supermolecular structures has been studied from the standpoint of the diffusion theory of adhesion in order to determine the effect of these structures on the formation of adhesive bonds. Experiments were conducted with polyethylene (PE) and with poly(vinyl chloride) (PVC) plasticized with various amounts of dibutyl sebacate (DBS) and consisted in determining by stripping tests the dependence of the work of autohesion on

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L 14281-63

ACCESSION NR: AP3004432

0

such factors as bonding time, temperature, and plasticizer content. The results of the study, presented in Figs. 1-3 of the Enclosure in the form of plots of bonding time or temperature versus work of autohesion, indicate that autohesion sets in only at temperatures far above the glass-transition temperature ( $T_g$ ). This phenomenon is explained by the presence of strong supermolecular structures which hinder the free diffusion of macromolecules or their sections. It is concluded that the formation of autohesive bonds between two polymer layers requires preliminary abstraction of macromolecules from the supermolecular structures. The results also indicate the presence at temperatures above  $T_g$  of ordered structures which break up at higher temperatures. The mechanism of autohesion of polymers with an ordered structure consists in the diffusion migration of macromolecules from bundles of one layer to bundles of the other, leading to restoration of the normal polymer structure at the contact surface. As a result of this process cohesive strength is attained. It is noted that 1) the data obtained make it possible to follow the breaking up of supermolecular structures step-by-step (single crystals  $\rightarrow$  bands  $\rightarrow$  bundles  $\rightarrow$  macromolecules), and 2) the determination of the work of autohesion and its dependence on bonding time and temperature can become a convenient method for studying the mobility of macromolecules and the stability of supermolecular structures. Orig. art. has: 3 figures.

Cord 2/62

L 18659-63

EWP(j)/EWT(m)/BDS AFFTC/ASD Pc-4 RM/MAY

ACCESSION NR: AP3005441

S/0020/63/151/005/1108/1109 64

AUTHOR: Konstantinopol'skaya, M. B.; Berestneva, Z. Ya.; Kargin, V. A. 63  
(Academician)

TITLE: Fibrillar single crystals in polyamide copolymers

SOURCE: AN SSSR. Doklady\*, v. 151, no. 5, 1963, 1108-1109

TOPIC TAGS: crystalline structure, crystallization, crystalline structure formation, secondary structure, fibril, fibrillar structure, fibrillar single crystal, copolymer, caprone-nylon-sebacamide copolymer, electron microscope, JEM-5J, ethylene glycol, substrate, carbon substrate, temperature effect, crystal nucleus, band-like formation, chain structure, lamellar crystal, amorphous fibril, caprone, nylon, sebacamide

ABSTRACT: Crystalline-structure formation in the caprone-nylon-sebacamide copolymer has been studied with the JEM-5J electron microscope. Specimens were prepared by applying a boiling solution of the copolymer in ethylene glycol onto carbon substrates whose temperatures varied from 20 to about 180C. Fibrillar structures were formed at all temperatures in this range. At 90C,

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L 18659-63

ACCESSION NR: AP3005441

well developed fibrillar crystals were formed; at 100C, crystal nuclei with fibrils building up on them; and at higher temperatures, less regular band-like formations. The entire process of fibrillar-crystal formation was thus observed. The effect of temperature on the crystallization of the copolymer is explained by the fact that the nature of the secondary structures formed depends on the degree of supersaturation of the solution. The latter is determined by the change in copolymer solubility with temperature and by the rate of evaporation at a given temperature. From this study, and from previous studies by Kargin and his associates, it is concluded that all peculiarities of structure formation which are dependent on the type of chain structure can be observed. Thus, regular polyolefins readily form lamellar crystals. In polystyrene, which has less regular chains and considerable molecular interaction, crystallization is slowed down and the entire process of structure formation, from amorphous fibrils to lamellar crystals, can be observed. In polyamide copolymers, which have irregular chains and exhibit a high degree of molecular interaction, only fibrillar crystals are formed, by a direct building up of fibrils. In polymers with a rigid cellulose-type chain, structure formation does not proceed beyond the amorphous-fibril stage. Orig. art. has: 3 figures.

Card 2/3

L 18659-63

ACCESSION NR: AP3005441

ASSOCIATION: Fiziko-khimicheskiy institut im. L. Ya. Karpova (Physicochemical  
Institute)

SUBMITTED: 5May63

DATE ACQ: 06Sep63

ENCL: 00

SUB CODE: CH, MA

NO REF SOV: 003

OTHER: 001

Card 3/3

FROLOVA, A.A.; KOZLOV, P.V.; KARGIN, V.A., akademik

Effect of mechanical factors on the rate of crystallization of  
isotactic polystyrene. Dokl. AN SSSR 153 no.2:394-397 N '63.  
(MIRA 15:12)

1. Moskovskiy gosudarstvennyy universitet im. M.V.Lomonosova.

KARGIN, V.A., akademik; KABANOV, V.A.; KARGINA, O.V.

Preparation and study of the catalytic properties of high-molecular weight polystyrene sulfonic acid. Dokl. AN SSSR 153 no.4:845-847 D '63. (MIRA 17:1)

1. Moskovskiy gosudarstvennyy universitet im. M.V. Lomonosova.

L 27865-65 EWT(m)/EPP(c)/EWG(m)/EWP(j)/T Pc-l/Pr-l RWH/GS/RM  
ACCESSION NR: AT4049843 S/0000/64/000/000/0076/0079 26  
25

AUTHOR: Sigodina, A. B.; Cherneva, Ye. P.; Kargin, V. A. 1 B-1

TITLE: Preparation of new, polymeric, homogeneous ion exchange membranes

SOURCE: Khimicheskiye svoystva i modifikatsiya polimerov (Chemical properties and the modification of polymers); sbornik statey. Moscow, Izd-vo Nauka, 1964, 76-79

TOPIC TAGS: styrene copolymer, styrenesulfonic acid, polymer film, polymer conductivity, ultraviolet irradiation, ammonium persulfate, zinc chloride, ion exchange membrane, acrylic acid copolymer, methacrylate copolymer, vinylacetate copolymer

ABSTRACT: A method is described for preparing polymeric, homogeneous ion-exchange membranes based on a copolymer of the n-propyl ester of styrenesulfonic acid and its potassium and sodium salts with other film-forming monomers without using divinylbenzene as a crosslinking agent. The procedure for preparing the monomer is described in detail. The n-propyl ester of styrenesulfonic acid had a b.p. of 23-26 G/20mm,  $n_D^{25} = 1.574$  and  $d_4^{25} = 1.165$ . A homogeneous ion-exchange film based on the copolymer of n-propyl styrenesulfonate and vinyl acetate was prepared by irradiation with a quartz lamp. Its capacity (based on Na) was 4.6 meq/g of dry membrane

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L 27865-65

ACCESSION NR: AT4049843

in the  $H^+$  form. The electrical resistivity was about 20 ohms/cm in the  $Na^+$  form and 70 ohms/cm in the  $H^+$  form. The mechanical strength of this film is low. A homogeneous, polymeric ion-exchange film based on the copolymer of n-propyl styrene-sulfonate and methacrylic acid was then prepared, at monomer ratios of 70:30 and 50:50 and with ultraviolet irradiation at 28-700 for 30 min. to 6 hr. This film is insoluble in both water and organic solvents. Its capacity is 9.6 meq/g. Films made from a copolymer of the potassium and sodium salts of styrenesulfonic acid with acrylic acid by crosslinking with irradiation had a capacity (based on  $8r^{++}$ ) of 9.9 meq/g. Films crosslinked with ammonium persulfate were also prepared. A material was then obtained from the potassium salt of styrenesulfonic acid by carrying out the polymerization in  $ZnCl_2$ . The resulting material was insoluble in water and organic solvents and had ion-exchange properties. Its capacity based on  $Na^+$  was 4.5-5.5 meq/g in the  $H^+$  form. The variation in the  $ZnCl_2$  content in the reaction mixture apparently affects the capacity of the resins only slightly. Orig. art. has: 1 figure

ASSOCIATION: Fiziko-khimicheskiy institut im. I. Ya. Karpova (Physicochemical Institute)

SUBMITTED: 11 Jun 62

ENGL: 00

SUB CODE: OC, GC

Card 2/2 NO REF SOV: 003

OTHER: 008

L 19759-65 EPA(s)-2/EWT(m)/EPF(c)/EPR/EMP(j)/P Pc-l/Pr-l/Ps-l/Pt-10 SSD/ESD/  
APWL/APGC(b)/ESD(gs)/ESD(t) WW/RM/MLX  
ACCESSION NR: AT4049863 S/0000/64/000/000/0237/0242

AUTHOR: Slovokhotova, N. A., Magrupov, M. A., Kargin, V. A.

TITLE: A study of the thermal degradation of polypropylene

SOURCE: Khimicheskiye svoystva i modifikatsiya polimerov (Chemical properties and the modification of polymers); sbornik statey. Moscow, Izd-vo Nauka, 1964, 237-242

TOPIC TAGS: polypropylene, polypropylene thermal degradation, infrared spectroscopy, disproportionation, free radical

ABSTRACT: Infrared spectroscopy of the decomposition products of isotactic and amorphous commercial polypropylene at temperatures up to 415C in sealed vessels or under continuous removal and recovery of the volatile products indicated that the initial decomposition involves the formation of vinyl groups and of propyl radicals on the terminals of chain segments, with disproportionation of the free radicals formed during the structural breakdown. Secondary reactions between the polymer and its products also occurred in the sealed tubes, characterized by the appearance of numerous conjugated double bond systems. X-ray analysis of the first (heavy) fraction of volatile decomposition products showed characteristics related to the  $\alpha$ -modification of crystalline polypropylene. Thus, the thermal process does not destroy the stereoregular and spiral

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L 19759-65

ACCESSION NR: AT4049863

2

configurations completely. The first fraction, obtained in 45 min. at 405C, comprised of all the volatile products of the amorphous polymer and 71% of all volatile products of the isotactic polymer. Intensive bands at 1156 and 975  $\text{cm}^{-1}$ , which are characteristics of the spiral configuration of the polymer chain, were detected in the first fraction, as well as in the second of three fractions obtained in increasing order of volatility. The results indicate that a single turn of the spiral chain may produce the 1156 and 975  $\text{cm}^{-1}$  bands. "The authors thank Yu. A. Zubov for preparing the roentgenograms." Orig. art. has: 1 table, 2 figures and 2 chemical equations.

ASSOCIATION: Fiziko-khimicheskiy institut im. L. Ya. Karpova (Physicochemical Institute)

SUBMITTED: 25Feb68

ENCL: 00

SUB CODE: MT,OC

NO REF SOV: 002

OTHER: 013

Card

2/2

KARGIN, V.A., akademik; NEYMAN, M.B., prof.; BUCHACHENKO, A.L.,  
kand. khim. nauk; MIKHAYLOV, V.V.; MASLOVA, I.P.;  
LUKOVNIKOV, A.F., kand. khim. nauk; MATVEYEVA, Ye.N.;  
BERLIN, A.A., prof.; YANOVSKIY, D.M., kand. khim. nauk;  
POPOVA, Z.V., kand. khim. nauk; LEVANTOVSKAYA, I.I.;  
KOVARSKAYA, B.M., kand. khim. nauk; ANDRIANOV, K.A., prof.;  
KUZ'MINSKIY, A.S., prof.; SLONIMSKIY, G.L., prof.; MAKUNI,  
Ye.B., tekhn. red.

[Aging and stabilization of polymers] Starenie i stabilizatsiya polimerov. Moskva, Izd-vo "Nauka," 1964. 330 p.  
(MIRA 17:3)

1. Akademiya nauk SSSR. Institut khimicheskoy fiziki.
2. Chlen-korrespondent AN SSSR (for Andrianov).

VASIL'YEV, Mikhail Vasil'yevich; KARGIN, V.A., akademik, nauchn.  
red.; GOLUBKOVA, V.A., red.

[Familiar strangers; chemical elements of the earth, water  
and air] Znakomye neznakomtsy; elementy zemli, vody i voz-  
dukha. Moskva, Sovetskaia Rossiia, 1964. 343 p.  
(MIU 17:7)

BERESTNIYA, Z. Ya.; KALASHNIKOVA, V. G.; KATHDAN, M. V.; KARGIN, V. A.

"Electronmicroscopic study of structure in rubbers."

report submitted to 3rd European Regional Conf, Electron Microscopy,  
Prague, 26 Aug-3 Sep 64.

L 55203-65 EWD(j)/EWT(1)/EWT(h)/EWG(v)/EWP(j)/EEG(t)/T/EEB(b)-3/EWA(h)/  
 EWA(1) Po-4/Po-5/Peb/P1-4 IJP(c) 1W  
 UR/0058/65/001/008/D035/D035  
 ACCESSION NR: AR5012259  
 SOURCE: Ref. zh. Fizika, Abs. 3D258  
 AUTHOR: Sadovskaya, G. K.; Slovokhotova, N. A.; Vasil'yev, L. A.; Kargin, V. A.  
 TITLE: Use of infrared spectroscopy to study the effect of fast electrons on  
 polyamides  
 CITED SOURCE: Tr. Kom. po spektroskopii. AN SSSR, vyp. 1, 1964, 483-487  
 TOPIC TAGS: molecular spectroscopy, electron paramagnetic resonance, electron  
 bombardment, polyamide  
 TRANSLATION: Kapron, enant, polargon and undecane were bombarded with fast  
 electrons and their infrared spectra studied. Changes were observed in the  
 confirmation of the chains and the formation of double bonds in the 980 cm<sup>-1</sup>  
 band and of ion radicals in the 2150 cm<sup>-1</sup> band were also observed. The data was  
 compared with measurements from the electron paramagnetic resonance spectra. The  
 mechanism for processes that occur in the irradiation of polyamides is proposed.

Card 1/2

BERESTNEV, V.A.; NAGDASEVA, I.P.; KOZYREVA, Z.M., TOKAREVA, L.G.;  
POTEMKINA, Z.I.; MIKHAYLOV, N.V., KARGIN, V.A.

Effect of thermal stabilizers on the structure of capron  
fibers. Khim. volok. no.2:35-41 '64. (MIRA 17:5)

1. Nauchno-issledovatel'skiy institut shiriny pleteniya  
(for Berestnev, Nagdaseva, Kozyreva). 2. Vsesoyuznyy nauchno-  
issledovatel'skiy institut iskusstvennogo volokna (for  
Tokareva, Potemkina, Mikhaylov).

ACCESSION NR: AP4019020

S/0062/64/000/002/0391/0392

AUTHORS: Topchiyev, D.A.; Popov, V.G.; Kabanov, V.A.; Kargin, V.A.

TITLE: Polymerization of quinoline and autocatalysis forming macro-molecules with conjugate system

SOURCE: AN SSSR. Izv. Seriya khimicheskaya, no.2, 1964, 391-392

TOPIC TAGS: quinoline polymerization, quinoline autocatalysis, quinoline, autocatalysis, autocatalytic reaction, quinoline zinc chloride complex

ABSTRACT: Seeking autocatalytic reactions having general applications the authors investigated the polymerization of the quinoline-zinc chloride complex ( $Qui_2ZnCl_2$ ) in the presence of catalytic quantities of proton-containing substances ( $HPO_3$ ,  $Qui \cdot HCl$ ) over the temperature range of 250-3700. They obtained polymer products varying in color from red to black (depending upon the conditions). They were poly-quinolines with a structure of



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ACCESSION NR: AP4019020

Thus quinoline polymerization takes place with opening of the heterocycle. Similar to the case of pyridine, the operation is autocatalytic, i.e., it is stimulated by "seeding" the mass with a sample of already polymerized product. It is typical that the best results are obtained with a "seed" prepared at the same temperature as that of polymerization. The reaction is highly specific. Orig. art. has 1 figure, one formula, no tables.

ASSOCIATION: Institut neftekhimicheskogo sinteza im. A.V. Topchiyeva  
(Institute of Petrochemical Synthesis)

SUBMITTED: 26Nov63      DATE ACQ: 27Mar64      ENCL: 00

SUB CODE: OH      NR REF SOV: 002      OTHER: 000

Card 2/2

SHIBAYEV, V.P.; PLATE, N.A.; TRAN K'YEU; KARGIN, V.A.

Structural and mechanical study of isotactic and stactic  
polystyrene graft copolymers. Vysokom. soed. 6 no.1:107-  
111 Ja'64. (MIRA 17:5)

1. Moskovskiy gosudarstvennyy universitet imeni Lomonosova.

ACCESSION NR: AP4009161

S/0190/64/006/001/0165/0168

AUTHORS: Kargin, V. A.; Sogolova, T. I.; Nadareyshvili, L. I.

TITLE: Investigation of supermolecular structure effect on mechanical properties of crystalline polymers 1. Production of various supermolecular structures during formation of gutta-percha films and study of their mechanical properties

SOURCE: Vy\*sokomolekulyarny\*ye soyedineniya, v. 6, no. 1, 1964, 165-168

TOPIC TAGS: supermolecular structure , gutta percha film, crystalline polymer, melt , optical microscope, mechanical property

ABSTRACT: Conditions for production of films with various supermolecular structures have been studied. Films with varying mechanical properties can be produced from the same crystalline polymer. The gutta-percha test films were produced both from melts and solutions, using as solvents: benzol,  $CCl_4$ , and tetrachloroethane. The structure of the films was investigated under the optical microscope MIM-8M and MIN-8. The mechanical properties of these films have been shown to depend upon their supermolecular structure. It is stressed that relations between mechanical properties and the nature of the supermolecular structure can be established most effectively by varying only one of the factors determining the

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ACCESSION NR: AP4009161

structuration process (temperature, solvent species, time of evaporation of the solvent, or cooling of the melt, etc.), all other parameters being kept strictly constant. Orig. art. has: 7 figures and 2 tables.

ASSOCIATION: Fiziko-khimicheskiy institut im. L. Ya. Karpova (Physicochemical Institute)

SUBMITTED: 14Nov62

DATE ACQ: 10Feb64

ENCL: 00

SUB CODE: PH

NO REF SOV: 007

OTHER: 004

Cord 2/2

ACCESSION NR: AP4009162

S/0190/64/006/001/0169/0173

AUTHOR: Kargin, V. A.; Sogolova, T. I.; Nadareyshvili, L. I.

TITLE: Investigation of the effect of supermolecular structure on the mechanical properties of crystalline polymers. 2. Nature of spherulite structure breakdown and mechanical properties on repeated gutta-percha film deformation

SOURCE: Vy\*sokomolekulyarny\*ye soyedineniya, v. 6, no. 1, 1964, 169-173

TOPIC TAGS: spherulite structure, repeated deformation, gutta percha film, supermolecular structure, supermolecular stress, supermolecular strain, film deformation

ABSTRACT: The character of the spherulite-like structure breakdown of gutta-percha films by repeated deformation has been investigated under microscope MIM-8. It is shown that mechanical properties of gutta-percha films may be changed over wide ranges by repeated deformation in mutually perpendicular directions. The supermolecular

Card 1/2

ACCESSION NR: AP4017628

S/0190/64/006/002/0189/0192

AUTHORS: Kargin, V. A.; Bort, D. N.; Shtarkman, B. P.; Minsker, K. S.

TITLE: Supermolecular structures arising directly in the polymerization process

SOURCE: Vyssokomolekulyarnyye soyedineniya, v. 6, no. 2, 1964, 189-192

TOPIC TAGS: polymerization, polymer, polyvinylchloride, polyethylene, supermolecular formation, catalyst, aluminum, chlorinated aluminum, tape formation, fibrillar formation, fagot, fibrillar orientation, solution, film, suspension, folded structure, crystalline structure

ABSTRACT: This investigation was conducted on crystalline polyvinylchloride (obtained in a butyraldehyde medium) and on polyethylene prepared in a benzene medium. In both instances partly chlorinated aluminum in combination with the alpha-alpha modification of titanium trichloride was used as catalyst. The obtained polyvinylchloride was dried, ground in a porcelain mortar, suspended in aqueous alcohol, spread on a collodion film, dried and subjected to examination on a Tesla-242M electron microscope at a 10 000-20 000 magnification. The polyethylene was split into fibers by means of a needle, and treated as in the preceding case. The electron microscopic picture of polyvinylchloride showed that the

Card 1/2

ACCESSION NR: AP4017628

particles consisted of fibrillar aggregate formations, the structure of which resembled accumulations of tapes and macrofagot packages. The authors assume that these structures were formed directly during the process of polymerization and were reconstructed only in the course of the subsequent procedure. Samples of polyethylene showed a similar structure but were more distinct. Here the tape diameter. Another structural type of polyethylene was dendritic, seemingly growing from the bit of aluminum. Similar structures were also obtained from solution in ortho-xylene. Orig. art. has: 3 pictures.

ASSOCIATION: none

SUBMITTED: 30Jun62

DATE ACQ: 23Mar64

ENCL: 00

SUB CODE: CH

NO REF SOV: 018

OTHER: 003

Card 2/2

ACCESSION NR: AP4017633

S/0190/64/006/002/0231/0236

AUTHORS: Shibayev, V. P.; Plate, N. A.; Grushina, R. K.; Kargin, V. A.

TITLE: Structuration in chlorinated polyethylene and its solutions

SOURCE: Vyssokomolekulyarnyye soedineniya, v. 6, no. 2, 1964, 231-236

TOPIC TAGS: polymer, polymer structure, polyethylene, chlorinated polyethylene, supermolecular structure, chlorobenzene solution, crystalline structure, gaseous crystalline state, spherulite, bundle, amorphous state, primary morphological form, ordered morphological form

ABSTRACT: A high-crystalline fraction of polyethylene was used (molecular weight of 260 000) which was obtained by removing the low-molecular fractions by boiling in carbon tetrachloride and double recrystallization in chlorobenzene. The samples were chlorinated by means of a saturated solution of chlorine at 115, 125, and 130C, under incandescent lamplight. The resulting products were either fully or partly soluble in chlorobenzene (the insoluble part was purified by methanol precipitation from toluene solutions). Polyethylene samples with a chlorine content of 3 to 50% were obtained: these were subjected to x-ray and electron microscopic studies in m-xylene solutions and in crystalline structures obtained therefrom. It was found  
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ACCESSION NR: AP4017633

that the chlorinated polyethylene compounds obtained at 115 and 125°C were not homogeneous in their composition, the cold chlorobenzene soluble fraction containing 14.0 and 17.9% of chlorine, while the chlorobenzene insoluble fraction contained 8.2 and 7.0% of chlorine, respectively. Only at a reaction temperature of 130°C, which corresponds to the melting point of the crystalline polyethylene, did the chlorinated product become fully soluble. The samples of polyethylene containing up to 8% chlorine possessed the ability to crystallize and to form spherulites and monocrystals, while the samples with a higher chlorine content revealed structures indicating a gaseous-crystalline state. At a 50% chlorine content the polyethylene acquired an amorphous structure. Orig. art. has: 1 chart, 2 tables, 8 electron-microscope pictures, and 1 x-ray picture.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova (Moscow State University)

SUBMITTED: 01Nov62

DATE ACQ: 23Mar64

ENCL: 00

SUB CODE: CH

NO REF SOV: 008

OTHER: 010

Card 2/2

ZUBOV, Yu.A.; TSVANKIN, D.Ya.; MARKOVA, G.S.; KARGIN, V.A.

Large periods in polypropylene fibers. Part 1: Effect of orientation and heat treatment (annealing) on the size of the large periods. Vysokom. soed. 6 no.3:406-411 Mr'64. (MIRA 17:5)

1. Nauchno-issledovatel'skiy fiziko-khimicheskiy institut imeni Karpova.

L 9369-65 BTP(z)/BTP(j) P-4 RAEM(t)/ASD(z)-5/AFAL EM

ACCESSION NR: AP4030357

1/0190/64/006/003/0441/0443

AUTHORS: Kargin, V. A.; Korotkiya, T. A.; Bogayevskaya, T. A.

TITLE: Crystallization of isotactic polystyrene 1

SOURCE: Vyssokomolekulyarnyye soyedineniya, v. 6, no. 3, 1964, 441-443

TOPIC TAGS: polystyrene, isotactic polystyrene, amorphous isotactic polystyrene, toluene, xylene, decaline, bundle formation, spherulite formation, crystallization

ABSTRACT: The objective of the present investigation was to clarify the structuration processes in solid polymers at temperatures above the vitrification point. Isotactic polystyrene was selected for this study since its relaxation processes proceed at a lower rate, thus facilitating the observation of the separate stages of crystallization. The investigation was conducted with an electron microscope on 0.002-0.1% solutions in xylene, toluene, and decaline, and on the solid state of the polymer. When the solutions (prepared at the boiling points of the respective solvents) were evaporated at 1100, the polystyrene was amorphous. When the polystyrene was dissolved in xylene at 95-97°C and then allowed to cool to 25°C, spherulite-like structures separated out. Solutions of isotactic polystyrene in decaline (when allowed to cool down to 25°C) yielded amorphous fibrous structures.

Cont 1/2

L 9069-65

ACCESSION NR: APL030357

On heating to 1200, these acquired a crystalline structure, forming bundles. It was further shown that isotactic polystyrene, obtained in an amorphous state from solutions in xylene, toluene, or decaline, when heated to 140-200C, produced crystalline plates or planes which became twisted, forming fibrils, bundles, and spherulites. It was shown that the nature of the solvent exerts an essential influence on the structure of isotactic amorphous polystyrene and that a partial destruction of bundle structures takes place at temperatures far below the melting point of the crystals. Orig. art. has 12 electron microscope pictures.

ASSOCIATION: Nauchno-issledovatel'skiy fiziko-khimicheskiy institut (Scientific Research Physico-chemical Institute)

SUBMITTED: 02Mar63

SUB CODE: 88, 00

NO REF SOV: 005

ENCL: 00

OTHER: 003

Cord 2/2

ACCESSION NR: AP4030371

0/000/00/000/000/00.5

AUTHORS: Topchiyava, I. M.; Zicbin, V. M.; . . .; V. M.; I. M.; R. M.;  
Kabanov, V. A.; Kargin, V. A.

TITLE: Synthesis of optically active polymers on the basis of propylendiamine and  
cyclopropanedicarboxylic acid

SOURCE: Vyssokomolekulyarnyye soyedineniya, v. 6, no. 3, 1984, 52-56

TOPIC TAGS: polymer, optically active polymer, polyamide, cyclopropanedicarboxylic  
acid, propylene-1,2-diamine, interfacial polymerization, dichloride of cyclopro-  
panedicarboxylic acid, turbidimetric titration

ABSTRACT: Synthesis of an optically active polymer from racemic components where  
the rate of incorporation of the D or L forms into the macromolecule differed was  
investigated. To 0.35 gm of racemic propylenediamine (in 100 ml water containing  
0.8 gm KOH, at room temperature and under energetic stirring) were added dropwise  
0.75 gm of the dichloride of trans-cyclopropanedicarboxylic-1,2 acid in 90 ml of  
chloroform. After standing 30 minutes the polyamide was separated by filtration,  
washed with 10% HCl and water, and purified by dissolution in 85% formic acid and  
precipitation 1/2

ACCESSION NR: AP4030371

subsequent precipitation with ammonia. The synthesis of a polyamide from L-propylenediamine was conducted in a similar way. From this polyamide the cyclopropylenedicarbonic acid component was recovered by hydrolysis with phosphoric acid, treatment with barium hydroxide, and passage through a column containing the cationic resin KU-2. The recovered acid was found to be optically inert, while the polyamide itself displayed an optical rotation of a sign opposite to that of the original L-propylenediamine (its optical rotation dispersion curve being normal). It was also observed that the melting point of the optically active polymer was 40 to 50 degrees higher than that of the racemic polyamide. Orig. arb. lang: 1 formula and 3 charts.

ASSOCIATION: Moscovskiy gosudarstvennyy universitet im. M. V. Lomonosova (Moscow State University)

SUBMITTED: 26Mar63

DATE ACQ: 07May64

ENCL: 00

SUB CODE: CH

NO REF SOV: 002

OTHER: 007

Card 2/2

L 41766-65 EPF(c)/EPF(n)-2/ENG(j)/EMA(h)/EMP(j)/ENT(m)/T/EMA(1) PC-4/Pr-4/Pu-4/  
Feb GG/RA

ACCESSION NR: AP4032561

51  
47 3/0190/64/006/004/0608/0614  
B

AUTHORS: Slovokhotova, N. A.; Il'icheva, Z. F.; Vasil'yev, L. A.; Kargin, V. A.

TITLE: Effect of ionizing radiation on the structure of polypropylene

SOURCE: Vysokomolek. soedin., v. 6, no. 4, 1964, 608-614

TOPIC TAGS: polypropylene, irradiation, polymer, IR absorption, spectrophotometer / N-800 spectrophotometer

ABSTRACT: Films of isotactic and commercial amorphous polypropylene were prepared by hot pressing. They were irradiated in a vacuum ( $10^{-4}$  mm) at 25 and  $-196^{\circ}\text{C}$  by fast electrons from an acceleration tube (voltage of accelerating field = 200 kv) and by  $\text{Co}^{60}$  gamma rays. Infrared spectra of the initial and irradiated specimens were recorded on an N-800 spectrophotometer. Absorption bands at 890 and  $910\text{ cm}^{-1}$  for irradiated specimens correspond to the double bands  $\text{C}=\text{CH}_2$  and  $\text{RCH}=\text{CH}_2$ . These bands are due to degradation of polypropylene through radiation. Bands in the 815-855 region and at  $1665\text{ cm}^{-1}$  correspond to  $\text{R}_2\text{C}=\text{CHR}$  bonds in the

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L 41766-65

ACCESSION NR: AP4032561

irradiated polypropylene. The degradation of polypropylene during irradiation involves simultaneous rupture of the C-C and C-H bonds, with the formation of molecules containing propyl and vinylidene. The number of vinylidene double bonds observed in the spectrum depends markedly on the phase of the polymer and on the temperature of irradiation. The number in specimens irradiated at room temperature may be 2.5 times the number in specimens irradiated at -196°C. The number in amorphous polypropylene may be 2.7 times the number for isotactic polypropylene (other factors being the same). Electron paramagnetic resonance spectra show that heating irradiated specimens above 800 gives rise to free polyene radicals, and this indicates that the double bond may migrate along the polymer chain. The crosslinking of two double bonds leads to the appearance of lower frequency bands in the spectrum. Crosslinking with an unpaired electron probably lowers the oscillation frequency of the double bond also. Increase in absorption in the  $16.5 \text{ cm}^{-1}$  region may take place by double bond absorption in the allyl radical, the oscillation frequency of which is lowered because of the crosslinking of  $\pi$ -electrons of the double bond with an unpaired electron of the radical. Orig. art. has: 2 figures, 1 table, and 2 formulas.

ASSOCIATION: Nauchno-issledovatel'skiy fiziko-khimicheskiy institut im. L. Ya. Karpova (Scientific Research Physico-chemical Institute)

Card 2/3

L 41766-65

ACCESSION NR: AP4032561

SUBMITTED: 08Apr63

NO REF SOV: 003

ENCL: 00

SUB CODE: 00

OTHER: 006

CC  
Card 3/3

L 42289-65 EPF(c)/EPR/EPA(s)-2/EWP(j)/ENT(m)/EPP(l)/EWP(b)/T/EWP(e) Pc-4/Pq-4/  
 ALLOCATION NR: APL037272 Pr-4/Pr-4 RM/WH/WH S/CLPO/64/006/005/0787/0790

AUTHORS: Malinskiy, Yu. M.; Trifol', B. Yu.; Kargin, V. A.

TITLE: Studies of breakup of reinforced plastics. 1. Investigation of models of unoriented glass reinforced plastic

SOURCE: Vyssokomolekulyarnyye soedineniya, v. 6, no. 5, 1964, 787-790, and two inserts following p. 788

TOPIC TAGS: glass reinforced plastic, glass reinforced plastic breakup, polyester plastic binder, polyester PN 1, polyester PH 3, polyester PH 4, glass rod, glass polymer interface stress, tensile test, FMPw 250 dynamometer

ABSTRACT: Test specimens in the shape of double-bladed paddles were made of polyesters PN-1, PH-3, and PH-4, reinforced with a single or multiple longitudinal alkali-free or molybdenum-bearing glass rod 50  $\mu$  - 1 mm in diameter. The polymers were hardened for 20-24 hours at room temperature in the presence of an initiator and accelerator, and were heated for 4 hours at 800. The specimens, with 40-mm long constricted central portions and with paddle areas of  $(2.5-3.0) \times 8$  mm, were stretched on a FMPw-250 dynamometer at the rate of 30 mm/minute. Motion picture records of the experiments were made in polarized light. The results of tests on

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L 42289-65

ACCESSION NR: AP4037272

550 specimens showed that in the single-rod reinforced plastic a gradual cracking occurred in the glass rod. The number of cracks increased with time and with the concentration of stresses near the zone of failure. It was shown by V. A. Kargin, Yu. M. Malinskiy, and A. L. Rabinovich (Dokl. AN SSSR, 157, No. 3, 1961) that adhesive forces to a layer of polymer, unevenly distributed shearing stresses (7) originated on the interphase boundary, while near the end of the element (zone 9) there appeared an area of sharp concentration of stresses. These findings were confirmed by photographic records. It was also found that when the reinforcing rod was ruptured in several places, the breakdown of the plastic specimen took place where the strength of the polymer was the lowest. The character of the polymer break offered further proof that the original crack occurred on the glass-polymer boundary. Near the broken surface there was a glossy area, becoming dull and rough toward the edges of the polymer. The overstresses near the end of the reinforcing element produced a weakening of the specimens reinforced by either a single rod or by several rods. Reinforcing by previously fragmented rods brought about strength improvement. No advantage was gained by placing the rods at 20 degrees to each other. The authors are grateful to A. L. Rabinovich for discussion of the paper. Orig. art. has: 5 charts and 5 pictures.

ASSOCIATION: Fiziko-khimicheskiy institut im. L. Ya. Karpova (Physico-Chemical Institute)

C-10 2/3

SUBMITTED 12/22/63

ACCESSION NR: .AP4037286

S/0190/64/006/003/0906/0909

AUTHOR: Kalashnikova, V. G.; Kazhdan, M. V.; Berestneva, Z. Ya.; Kargin, V. A.

TITLE: Electron microscopic study of the structure of rubbers. II

SOURCE: Vy\*sokomolekulyarny\*ye soyedineniya, v. 6, no. 5, 1964, 906-909, and inserts between p. 906 and 907

TOPIC TAGS: natural rubber, sodium butadiene rubber, butadiene styrene rubber, polychloroprene rubber, stereoregular isoprene rubber, stereoregular butadiene rubber, rubber structure, ribbon rubber structure, fibril rubber structure, spherulite rubber structure, spiral rubber structure, rubber elasticity, rubber failure, rubber structure formation

ABSTRACT: The structure of and structure formation in rubbers have been studied by means of the electron microscope. Experiments were conducted with natural, sodium butadiene (SKB), butadiene-styrene (SKS), polychloroprene (Nairit A; neoprenes AS and N), and stereoregular isoprene (SKT) and butadiene (SKD) rubbers. It

Card 1/2

ACCESSION NR: AP4040481

S/0190/64/006/006/1022/1027

AUTHOR: Kargin, V. A.; Sogolova, T. I.; Shaposhnikova, T. K.

TITLE: Structure formation in and mechanical properties of chloroprene rubber

SOURCE: Vy\*sokomolekulyarny\*ye soyedineniya, v. 6, no. 6, 1964, 1022-1027

TOPIC TAGS: crystallizing polymer, polychloroprene rubber, Nairit A, polychloroprene film, structure formation

ABSTRACT: Structure formation in crystallizing elastomers as exemplified by Nairit-A (polychloroprene rubber) films about 200  $\mu$  thick has been studied to establish the relationship between mechanical properties and the supramolecular structure of the elastomers. The films were prepared by evaporation from various solvents and the process of structure formation in individual specimens under various conditions was observed with the MIM-8 microscope. It was shown that dendrite structures, cruciform crystals, and crystals with

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ACCESSION NR: AP4040481

regular faces are formed at the film surfaces. The growth of these supramolecular formations ceases after about 150 hr of crystallization. Simultaneously, a fine spherulite structure is formed in much of the body of the film; this process stops after approximately 220 hr. A considerable strengthening of films observed after termination of the growth of the larger supermolecular structures was ascribed to spherulitization of the films. It was also shown that in the case of Nairit-A spherulitization of a crystallizing rubber and the presence of larger supramolecular structures does not cause a loss of the elastic properties and does not hinder development of significant reversible deformations in these elastomers. It is concluded that the elasticity of crystallizing elastomers is due not only to the elasticity of individual macromolecules, chain bundles, ribbons, and fibrils but also to the elasticity of more complex supramolecular formations — spherulites, dendrites, and even crystals with regular faces. Orig. art. has: 2 figures and 1 table.

ASSOCIATION: Fiziko-khimicheskiy institut imeni L. Ya. Karpov  
(Physicochemical Institute)

Card 2/3

ACCESSION NR: AP4040492

S/0190/64/006/006/1116/1119

AUTHORS: Malinskiy, Yu. M.; Guzeyev, V. V.; Zubov, Yu. A.; Kargin, V. A.

TITLE: Thermodynamics of the deformation of oriented fibers. 1. Temperature dependence of a caprone fiber

SOURCE: Vyssokomolekulyarnyye soyedineniya, v. 6, no. 6, 1964, 1116-1119, and insert facing p. 1073

TOPIC TAGS: caprone fiber, reversible contraction, crystal pulling, shrinkage hysteresis, temperature dependence

ABSTRACT: The authors studied the temperature dependence (in the range 20 to 70C) of the length of polycaprolactam fiber samples, previously pulled to various degrees. The extent of reversible contraction on heating and lengthening on cooling depends upon the degree of the pulling and on the crystallinity. For fibers swollen in water the relation of temperature to change in fiber length is about four times that for air-dried specimens. The temperature dependence of the water content and desorption processes markedly affects this relationship. It is concluded that the phenomenon of reversible contraction during heating is due to the tendency of oriented macromolecules to increase the conformational assemblage,

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ACCESSION NR: AP4040492

which prevails over ordinary thermal linear expansion. Orig. art. has: 1 figure,  
1 table, and 4 formulas.

ASSOCIATION: Fiziko-khimicheskiy institut im. L. Ya. Karpova (Physicochemical  
Institute)

SUBMITTED: 23Jul63

SUB CODE: MT

NO REF SOV: 005

ENCL: 00

OTHER: 004

Card

2/2

ACCESSION NR: AP4040494

S/0190/64/006/006/1132/1135

AUTHOR: Selikhova, V. I.; Markova, G. S.; Kargin, V. A.

TITLE: Reversibility of deformation in the stretching of polypropylene spherulites

SOURCE: Vy\*sokomolekulyarny\*ye soyedineniya, v. 6, no. 6, 1964, 1132-1135

TOPIC TAGS: polypropylene, polypropylene film, polypropylene film stretching, polypropylene film retraction, supramolecular structure

ABSTRACT: The nature of the deformation of polypropylene films during stretch and after retraction has been studied with the MIN-8 polarization microscope. Experiments were conducted with polypropylene films prepared by various methods in order to obtain different supramolecular structures such as large spherulites, small spherulites, or fibrils. It was shown that the properties of stretched films are highly dependent on the structure of the initial

Card 1/2

ACCESSION NR: AP4040495

S/0190/64/006/006/1136/1139

AUTHORS: Selikhova, V. I.; Markova, G. S.; Kargin, V. A.

TITLE: Use of electron diffraction in structural studies of polypropylene spherulites

SOURCE: Vy\*sokomolekulyarny\*ye soyedineniya, v. 6, no. 6, 1964, 1136-1139

TOPIC TAGS: electron diffraction, electron microscope YEM 5J, fibril, spherulitic structure, polypropylene

ABSTRACT: The authors studied the structure of polypropylene spherulites on a YEM-5J electron microscope, using samples cooled by liquid nitrogen. Microdiffraction photographs were obtained in the range  $-100$  to  $-140^\circ$ . For comparative purposes, x-ray diffraction patterns were obtained on similar spherulites with  $\text{CuK}\alpha$  radiation and a nickel filter. Spherulites 0.5-1.5 mm in diameter were obtained from a 1.5% xylene solution. On examination in the electron microscope the spherulites were found to consist of radiating fibrils, mostly exhibiting a herringbone pattern, with the lateral branches greatly enlarged and developing new branches. Electron diffraction showed that the axis of the molecular chains (the c axis) lies at an angle of  $65-71^\circ$  to the axis of a fibril. These results are in

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APPROVED FOR RELEASE: 06/13/2000

CIA-RDP86-00513R000720720002-1"

ACCESSION NR: AP4040495

good agreement with x-ray data. Rotation of structural axes was observed in the diffraction photograph (generally a very small angle), and it is concluded that this takes place by rotation of crystalline laminae near the  $[201]$  direction (axis of the fibril). "The authors consider it their duty to express sincere thanks to Yu. A. Zubov for participating in discussions of the results of this work." Orig. art. has: 7 figures.

ASSOCIATION: Fiziko-khimicheskiy institut im. I. Ya. Karpova (Physicochemical Institute)

SUBMITTED: 24Jul63

ENCL: 00

SUB CODE: MT, OP

NO REF SOV: 001

OTHER: 011

Card 2/2

CHURCH, Wm. H. NEW YORK; MARTIN, Wm.

President of the National Association of Manufacturers, Inc.  
New York, N.Y. 10017-2400 (NY 10017-2400)

1. President of the National Association of Manufacturers.

ACCESSION NR: AP4042181

S/0190/64/006/007/1167/1173

X

AUTHOR: Berestnev, V. A., Razikov, K. Kh. Kargin, V. A.

TITLE: Study of the supramolecular structure of super-strength viscose cord fiber

SOURCE: Vy\*sokomolekulyarny\*ye soyedineniya, v. 6, no. 7, 1964, 1167-1173, and insert facing p. 1168

TOPIC TAGS: cord, viscose cord fiber, super-strength, viscose fiber, electron microscopy, microstructure, macrostructure, polyethylene, polyethylene terephthalate, polyamide, viscose cord, viscose fiber, X-ray diffraction, cellulose

X

ABSTRACT: Fibers of a super-strength viscose cord (5.45/1 x 2) were investigated under the electron microscope at direct magnifications of up to 30,000. Photomicrographs of the longitudinal and oblique sections of microfibrils of supercord viscose fiber, microdiffraction pictures of high-velocity electrons and x-ray diagrams of the fiber texture are shown. The optically dense structural formations were found to consist of the same hydrated cellulose material as the total fiber. The fact that the macroformations in viscose fiber give a clear microdiffraction picture shows that the microformological structure of the hydrated cellulose fibers has a very high orientation, such as 200-250, which is far from being the

X

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Card

ACCESSION NR: AP4042181

limiting value. Concerning the crystallinity of cellulose, the experimental data confirm the hypothesis that the rigid-chain, noncrystalline polymers such as cellulose can form microstructural aggregates with a considerable degree of orientation, but these aggregates never attain the high perfection observed in crystalline polymers. In the superviscose fibers, very highly ordered structural macroformations are found, the appearance and development of which were investigated. The effect of stretching and modifiers on the structural formations is discussed. For polymers such as polyethylene, polyethylene terephthalate or polyamide fiber, the formation of micromorphological structures proceeds in two stages: during the production of unstretched polymer, oriented macrostructures are already formed in the viscose solution; during stretching, macrofibrils are formed in the polymer, inside which the macroformations decompose, first partially to separate, large elements (while their internal order is retained), and then completely to small formations of bundle dimensions. In order to obtain ordered anisodiametric particles, the stages of microformological structure formation must therefore be rigidly controlled. Orig. art. has: 5 figures. X

ASSOCIATION: Nauchno-issledovatel'skiy institut shinnoy promy\*shlennosti (Scientific Research Institute of the Tire Industry); Institut khimii polimerov AN SSSR (Institute of Polymer Chemistry AN SSSR); Fiziko-khimicheskii institut im. L. Ya. Karpova (Physicochemical Institute)

Card: 2/3

PAVLYUCHENKO, G.M.; GATOVSKAYA, T.V.; KARGIN, V.A.

Evaluation of the flexibility of polypropylene chains and  
some features of its sorption characteristics at high tem-  
peratures. Vysokom. soed. 6 no.7:1190-1192 JI '64

(MIRA 18:2)

1. Fiziko-khimicheskiy institut imeni Karpova.

KARGIN, V.A.; LITVINOV, I.A.

Processes of structure formation of polyacrylonitrile from  
solutions. Vysokom. soed. 6 no.7:1193-1194 J1 '64

(MIRA 18:2)

1. Institut neftekhimicheskogo sinteza imeni Tomchiyeva AN  
SSSR.

KARGIN, V.A.; SOGOLOVA, T.I.; NADAREYSHVILI, L.I.

Supramolecular structures in films of isotactic polypropylene  
and their mechanical properties. Vysokom. soed. 6 no.7:1272-  
1274 J1 '64 (MIRA 18:2)

1. Fiziko-khimicheskiy institut imeni Karpova.

ACCESSION NR: AP4043778

S/0190/64/006/008/1407/1410

AUTHOR: Kargin, V. A., Sogolova, T. I., Nadareyshvili, L. I.

TITLE: Effects of the spherulite structure breakdown pattern on the mechanical properties of isotactic polypropylene in a broad temperature range

SOURCE: Vy\*sokomolekulyarny\*ye soyedineniya, v. 6, no. 8, 1964, 1407-1410

TOPIC TAGS: polypropylene, isotactic polypropylene, polypropylene film, spherulite, spherulite breakdown, polymer mechanical property, polymer structure

ABSTRACT: A powdered isotactic polypropylene containing 88% of the isotactic fraction, 5% of a low-molecular fraction and 7% of the atactic fraction, molten at 180C, was gradually cooled to 80C in the course of 1 hr. during which films, 40-100  $\mu$  thick, with a spherulite structure composed of  $\sim 100 \mu$  grains were prepared to investigate the relationship between the mechanical properties of the material and the condition of the spherulite structure. Changes in the spherulite structure were examined with a MIN-8 optical microscope in a series of tests, conducted at 20, 50, 70 120 and 140C, in which film samples were stretched, using a pendulum dynamometer, at a rate of 3 cm/min. Depending on the temperature, uniaxial film stretching caused various changes in the film structure and mechanical properties. The changes, which have a rather complex pattern, are discussed

Card 1/2

ACCESSION NR: AP4043778

in detail and shown in photographs. At 20C brittle breakdown takes place with the spherulites remaining practically intact. At 50-70C considerable deformation with necking occurs, but with retention of the central parts of the spherulites and their interfacial boundaries. At 120C there is very large deformation, accompanied by breakdown of the spherulites into separate fibrils. At 140C the films breakdown at comparatively low deformation (breakdown of the specimen may be accompanied by fusing down of the rupture faces). The non-simultaneous appearance of various spherulites and supra-spherulite formations lead to differences in packing density, structure, size and mechanical properties of these elements, a consequence of which is their nonsimultaneous breakdown on stretching of the films. The decrease in sharpness of the neck boundary as the thickness of the specimens increases (other conditions being equal) is associated with the superposition of numerous micronecks formed in the separate structural elements of the film. Orig. art. has: 8 figures.

ASSOCIATION: Fiziko-khimicheskiy institut im L. Ya Karpova (Physical-Chemical Institute)

SUBMITTED: 13Aug63

SUB CODE: MT

NO REF SOV: 003

OTHER: 000

Card 2/2

ACCESSION NR: AP4043782

S/0190/64/006/008/1442/1449

AUTHOR: Pshezhetskiy, V. S., Kargin, V. A., Kapanchan, A. T., Ry\*bnikova, L. F.

TITLE: Solid phase polymerization of trioxane initiated by x-rays and Gamma rays

SOURCE: Vy\*sokomolekulyarny\*ye soyedineniya, v. 6, no. 8, 1964, 1442-1449

TOPIC TAGS: radiation polymerization, solid phase polymerization, X-ray, Gamma ray, trioxane, polyformaldehyde, polymerization inhibitor, radical polymerization

ABSTRACT: Polymerization of monocrystalline or polycrystalline trioxane to polyformaldehyde, during and after irradiation with x-rays (300 rad/sec.) or Gamma rays (500 rad/sec.) was studied in the presence of phenol, aniline, benzene, naphthalene,  $\beta$ -naphthylamine, phenanthrene, anthracene, decalin, butyraldehyde, paraldehyde and benzaldehyde in an attempt to clarify the role of the crystal lattice in both stages of the process. Additives which react with the polymer chains (aromatic compounds and aldehydes) were found to inhibit polymerization proportionally to the cube root of the inhibitor concentration, while additives not reacting with the chains showed no inhibitory effect at all. The polymerization began at temperatures above 313K, progressed at an increasing rate as the temperature

Card 1/2

Card

L 11381-65 EWT(m)/EPF(c)/EPR/ENP(1)/1 PC-4/Pr-4/PS-4 WW/RM  
 ACCESSION NR: AP4045420 B/0190/64/006/009/1559/1561  
 AUTHOR: Kargin, V. A.; Bogolova, T. I.; Rapoport-Molodtsova, N. Ya.  
 TITLE: Deformation of supraspherulite formations in plasticized isotactic polystyrene  
 SOURCE: Vy\*sokomolekulyarny\*ye soyedineniya, v. 6, no. 9, 1964, 1559-1561  
 TOPIC TAGS: supramolecular structure, spherulite, ribbon, ribbon lamina, uniaxial deformation, isotactic polystyrene, plasticized isotactic polystyrene, supramolecular structure deformation  
 ABSTRACT: The role of individual supramolecular structures in the deformation of polymers has been studied for plasticized isotactic polystyrene. The study was undertaken to determine the effect of supramolecular structures on the mechanical properties of polymers in order to make it possible to establish which structures best withstand different types of mechanical action. The experiments were conducted with films of slowly crystallized isotactic polystyrene plasticized with 18% cetyl chloride. The films contained various supramolecular  
 Cord 1/2

L 11381-65

ACCESSION NR: AP4045420

formations — spherulites, ribbons of spherulites, or laminas of ribbons — separated by amorphous regions. Deformation and failure of these structures during uniaxial stretching were observed with the MIN-8 polarizing microscope. Study of micrographs disclosed the nature of the deformation and failure of individual supramolecular formations. It showed that the deformation and failure are highly dependent on the arrangement of the formations in respect to the force field. Thus, the dependence of the mechanical properties of anisotropic supramolecular structures on the direction of the applied force field has been shown for the first time by direct experiments. Orig. art. has: 6 figures.

ASSOCIATION: Fiziko-khimicheskiy institut im. L. Ya. Karpova (Physicochemical Institute)

SUBMITTED: 14Aug63

ATD PRESS: 3114

ENCL: 00

SUB CODE: OC, MT

NO REF SOV: 006

OTHER: 000

Card 2/2

L 6606-65 BWP(m)/BWP(o)/BWP(j)/T Po-L/Pr-L RM

ACCESSION NR: AP4045421

S/0190/64/006/009/1562/1564

AUTHOR: Kargin, V. A.; Sogolova, T. I.; Repoport-Molodtsova, N. Ya. 52  
51

TITLE: Morphology of the process of neck formation during uniaxial stretching of crystalline polystyrene films 6

SOURCE: Vysokomolekulyarnyye soyedineniya, v. 6, no. 9, 1964, 1562-1564

TOPIC TAGS: polystyrene, crystalline polystyrene, polystyrene film, polymer film stretching, uniaxial stretching, neck formation, film necking, polymer film structure

ABSTRACT: Films for optical and mechanical studies of neck formation (in crystalline polymers) were prepared by melting purified isotactic polystyrene at 275C for 2 min between two microscope slides and crystallizing the melt at 160C. The number and pattern of crystallization centers were controlled by varying the duration of cooling from 1 to 2-1/2 hrs. The films were stretched at 160C, and their structure was examined with a MIN-8 polarization microscope. The results show that in completely spherulized films there is a discontinuous formation of structurally nonhomogeneous necks with alternating regions of oriented and nonoriented crystallization; the elongation of an individual spherulite usually has a discontinuous pattern with a distinct boundary line between the deformed and undeformed

Card 1/2

I 6608-65

ACCESSION NR: AP4045421

region; the pattern of deformation of spherulite "strings" markedly changes with crystallization rate; in a 1-hr. process the continuity of a string is disrupted between individual spherulite members, while in a 2.5-hr. process contacts between spherulites remain unaffected, and the deformation results in a single integral string of elongated individual spherulites; in a power field the deformation of spherulites has a stepwise character. The authors conclude that the structural pattern of necks arising during the elongation of crystalline films is determined by the supermolecular structure of the original film prior to the orientation process. Orig. art. has: 7 figures.

ASSOCIATION: Fiziko-khimicheskiy Institut Im. L. Ya. Karpova (Physical-Chemical Institute)

SUBMITTED: 24Aug63

ENCL: 00

SUB CODE: HT

NO REF SOV: 004

OTHER: 002

Card 2/2

KOVALEVA, V.P.; KUKINA, Ye.D.; KABANOV, V.A.; KARGIN, V.A.

Polymerization of pyridine in a complex with zinc chloride. Vysokom.  
sred. 6 no.9:1676-1683 S '64. (MIRA 17:10)

1. Moskovskiy gosudarstvennyy universitet imeni Lomonosova.

ACCESSION NR: AP4045435

S/0190/64/006/009/1684/1687

AUTHOR: Berlin, A.A., Ganina, V.I., Kargin, V.A., Kronman, A.G., Yanovskiy, D.M.

TITLE: Formation of salt groups by the reaction of poly[vinylchloride] with nitrile and methylvinylpyridine rubbers

SOURCE: Vy\*sokomolekulyarny\*ye soyedineniya, v. 6, no. 9, 1964, 1684-1687

TOPIC TAGS: poly[vinylchloride], nitrile rubber, methylvinylpyridine rubber, plasticization, polymer infrared spectrum polymer, impact strength, pyridine salt, volume resistivity, grafted copolymer

ABSTRACT: The proposed mechanism of formation of grafted copolymers, their infrared spectra, volume resistivity and some physico-mechanical properties of the products of coplasticization of poly[vinylchloride] (PVC) with nitrile and methylvinylpyridine synthetic rubbers were investigated on 0.08 mm thick films made from a 1:1 mixture of PVC and rubber. Models for the grafted copolymers of PVC with methylvinylpyridine rubbers (MVP) were low-molecular pyridine salts. The absorption spectra of PVC, MVP and their coplasticization products showed that the absorption bands of PVC and rubber appear in the spectrum of the coplasticization product either unchanged or with a slight displacement.

Card 1/3

ACCESSION NR: AP4045435

Some bands characteristic of PVC coalesce with the corresponding MVP bands. There, the width and intensity of the separate bands change. The appearance of new bands for the reaction product at  $1628$  and  $1470\text{ cm}^{-1}$  can be explained by the absorption of the pyridine ion, for which two characteristic bands lie in the regions of  $1630$ - $1640$  and  $1485$ - $1490\text{ cm}^{-1}$ . The low-molecular pyridine salt shows a very sharp peak at  $1636\text{ cm}^{-1}$  and a wide intensive peak with a maximum in the region of  $1470$ - $1480\text{ cm}^{-1}$ . It has been confirmed by the spectra that during the coplasticization of PVC and MVP, by the interaction of their functional groups, grafted copolymers having the structure of high-molecular pyridine salts are produced. The volume resistivity data for PVC-MVP and PVC-nitrile grafted copolymers as well as for the coplasticization of PVC with butadiene and butadiene-styrene (SKS-30) rubbers, are tabulated. The volume resistivity decreases considerably if the amount of rubber, containing functional groups which interact with the chlorine atoms of PVC, is increased. This increase in electrical conductivity for PVC compositions with rubber may be due to the formation of an ionic structure in the grafted copolymers or to the accumulation of hydrogen chloride in the system, as a result of the dehydrochlorination of PVC during plasticization. Analysis of aqueous-acetone extracts showed the absence of chlorine and hydrogen atoms in the composition. The

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ACCESSION NR: AP4045435

coplasticization products also have a high impact strength. Compositions of PVC with nonpolar rubbers containing no functional groups able to react with PVC are characterized by a low impact strength and low relative elongation, due to the absence of a chemical bond between PVC and the rubbers, as well as to their incompatibility. Orig. art. has: 1 figure and 2 tables.

ASSOCIATION: none

SUBMITTED: 16Nov63

ENCL: 00

SUB CODE: OC, MT

NO REF SOV: 004

OTHER: 004

Card 3/3

ACCESSION NR: AP4045436

S/0190/64/006/009/1688/1692

AUTHOR: Berlin, A.A., Kronman, A.G., Yanovskiy, D.M., Kargin, V.A.

TITLE: Mechanism of the processes occurring in the coplasticization of poly[vinylchloride], nitrogenous rubber, methylvinylpyridine, isoprene, graft polymer, polymer impact strength, hydroquinone

SOURCE: Vy\*sokomolekulyarny\*ye soyedineniya, v. 6, no. 9, 1964, 1688-1692

TOPIC TAGS: coplasticization, copolymer, poly[vinylchloride], nitrogenous rubber, methylvinylpyridine, isoprene, graft polymer, polymer impact strength, hydroquinone

ABSTRACT: The properties of grafted copolymers synthesized by the joint plasticization of poly[vinylchloride] (PVC) with nitrile (SKN) and methylvinylpyridine (MVP) rubbers were investigated in order to clarify the molecular and radical mechanisms occurring during the formation of these copolymers. Films 0.4-0.6 mm thick obtained from a 0.5% solution of polymer in cyclohexanone at a PVC: rubber ratio of 9:1 were tested for strength and viscosity. It was found that the maximum tensile strength for films of grafted copolymers is much lower than for films obtained from the corresponding mechanical mixtures. This is due to the loosening of the polymer structure resulting from the grafting process, which leads to the formation of systems characterized by lower density

Card 1/3

ACCESSION NR: AP4045436

and air-filled micropores. Viscosimetric investigations showed that the intrinsic viscosity of mechanical mixtures of PVC with MVP-15, SKN-18, SKN-26 and SKN-40 is intermediate between the viscosities of the initial polymers, but that the viscosity of the corresponding coplasticization product is lower than the viscosity of either initial polymer. However, the viscosity of the coplasticization product of PVC with isoprene rubber (SKI) and that of their mechanical mixture are almost identical and are intermediate between the viscosities of the initial polymers. This is due to the absence of functional groups in isoprene rubber able to react with PVC, which results in a mechanical mixture during their coplasticization. The specific viscosity-concentration curves for a PVC composition containing 10% MVP-15, plasticized for 2.5, 5, 10 and 20 min., show that the viscosity decreases with decreasing reaction time while the Huggens constant increases. During the plasticization of PVC with 10% isoprene rubber, the viscosity remains unchanged with time, but the concentration-viscosity curves for 2.5, 5 and 20 min. almost agree. This confirms the theoretical difference in the processes of plasticization of PVC with rubbers with or without functional groups which can react with it. The effect of the addition of hydroquinone to the mixture on the properties

Cord 2/3

ACCESSION NR: AP4045436

of the coplasticization product of PVC with rubbers was also studied. Plasticization with 1% hydroquinone, used as an acceptor of free radicals, showed that hydroquinone does not affect the impact strength of the samples and decreases the reduced viscosity of the plasticization products only slightly. Thermal dynamic curves show that hydroquinone by hindering the recombination of radicals and cross-linking, improves the flow properties of the composition slightly. The decrease in temperature promotes the destruction of the macromolecules during mechanical processing. On the basis of the experimental data, it was established that the role of radical processes in the formation of grafted polymers is small. Orig. art. has: 4 figures and 2 tables. .

ASSOCIATION: none

SUBMITTED: 16Nov63

ENCL: 00

SUB CODE: OC, MT

NO REF SOV: 006

OTHER: 001

Card 3/3

L 17834-65 EPA(s)-2/EWT(m)/EFF(g)/ENP(v)/EPR/ENP(j)/T Pc-l/Pr-l/Ps-l/Pt-l0  
ASD(f)-2/AEDC(a)/AFWL/AFTC(a)/AFETR/ESD(gs)/ESD(t) RM/WW

ACCESSION NR: AP4045437

S/0190/64/006/009/1708/1712

AUTHOR: Malinskiy, Yu. M.; Trifel', B. Yu.; Kargin, V. A.

TITLE: Effect of certain physicochemical properties of the binder<sup>615</sup>  
and filler on the strength of materials

SOURCE: Vy\*sokomolekulyarny\*ye soedineniya, v.6, no. 9, 1964, 1708-1712

TOPIC TAGS: glass reinforced plastic, binder elongation, filler elongation, polymer shrinkage, polymer nature, overstress, boundary layer, adhesive band, adhesive strength

ABSTRACT: The effects of the difference in the elongation of the binder and the filler, of the chemical nature of the polymer, and of its shrinkage during curing on the magnitude of over stresses at the boundary layer have been studied with model specimens made of a number of plastics, reinforced<sup>15</sup> with one or two glass rods, and cured by special methods. The destruction mechanism of the specimens was studied with motion pictures. It was shown that the rate of over stresses

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L 17834-65

ACCESSION NR: AP4045437

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at the glass-polymer boundary increases with an increase in the shrinkage of the binder during the curing and with an increase in the adhesive bond strength between the polymer and the filler. These overstresses adversely affect the strength of glass-reinforced plastics having a low (e.g., 20%) filler content. Overstresses in glass reinforced plastics with a high filler content (about 80%) have much less effect on the strength of plastics. In this case shrinkage plays the role of a certain additional "reinforcing" factor between the glass and the polymer and promotes a more uniform distribution of stresses on the reinforcing elements. A decrease in the difference between the elongation of the filler and the binder decreases the role of overstresses. Overstresses at the boundary occurred in all specimens studied, which were made of polymers with very different properties, such as unmodified and thiocol-modified epoxides, PN-1 maleic polyester, and MDF-2 polyester-acrylate. Orig. art. has: 2 figures and 2 tables.

ASSOCIATION: Fiziko-khimicheskiy institut im. L. Ya. Karpova (Physicochemical Institute)

Cord 2/3

L 1783h-65

ACCESSION NR: AP4045437

SUBMITTED: 22Nov63

ENCL: 00

SUB CODE: MT

NO REF SOV: 004

OTHER: 001

0

Card 3/3

L 3975-65 ENG(j)/EWT(m)/EPP(c)/SWP(t)/EPP(n)-2/EPR/SWP(b) Pr-4/Ps-4/Pu-4  
IJP(c) JD

ACCESSION NR: AP4047423

S/0136/64/000/010/0045/0047 4/5

AUTHORS: Andreyev, A.Ye.; Rodyakin, V.V.; Vaynshteyn, G.M.; Kargin, V.M.; Brodskiy, E.Ye.; Ecyko, Yu.N.; Tklich, V.S.; Khabarova, N. P.

TITLE: Changes in magnesium quality during the refining process

SOURCE: Tsvetnyye metally\*, no. 10, 1964, 45-47

TOPIC TAGS: nitrogen, oxygen, chlorine, impurity, magnesium, flux refinement, recovery, transport

**ABSTRACT:** The method of oxygen and nitrogen control in magnesium was used to assess the effectivity of removing admixtures. Flux refining was employed and specimens taken from two cells of each electrolyzer as well as before and after refining and 15 to 20 min settling. The quality of refined Mg did not differ substantially from that of the crude ore. The amounts of Fe in Mg changed negligibly and the higher content in the crude product was attributed to the drastic temperature drop that accompanies the transport of the metal to the refining furnaces. Neither did chlorine undergo any major changes and the proposed process did not affect the quality

Card 1/2

L 39755-65

ACCESSION NR: AP4047423

of the metal with respect to chlorine. Thus, the authors were able to retain the original level of oxygen and nitrogen in Mg by combining the proper temperature conditions with flux refining and settling time. The combined refining process is recommended until the transport of crude Mg is improved at which time it will become possible to use crude Mg as a reducing agent. Orig. art. has: 1 table and 1 figure.

ASSOCIATION: None

SUBMITTED: 00

ENCL: 00

SUB CODE: MM

NR REF SOV: 006

OTHER: 002

Card *2/2*

L 10376-65

Pz-6

EWI(1)/EPA(2)-2/EBG(k)/EWT(m)/EPF(c)/EWP(j)/T Pc-4/Pr-4/Pt-10/  
IJP(c)/RPL/ESD(dp)/AFWL/ASD(s)-5/ESD(t)/RAEM(t)/Pa-4 AT/RM

ACCESSION NR: AP4047208

B/0190/64/006/010/1814/1820

AUTHOR: Topchiyev, D. A.; Kabanov, V. A.; Kargin, V. A.

TITLE: Polymerization of quinoline in a complex with zinc chloride

SOURCE: Vysshemolekulyarnyye soyedineniya, v. 6, no. 10, 1964, 1814-1820

TOPIC TAGS: quinoline, polyquinoline, zinc chloride, organic semiconductor, semiconducting polymer

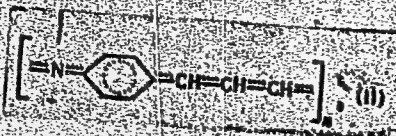
ABSTRACT: A study has shown the feasibility of the polymerization of quinoline in a complex with  $ZnCl_2$ . The  $(C_9H_7N)_2 \cdot ZnCl_2$  complex polymerized in the melt at above  $310^\circ C$  to form dark products. In the presence of a proton-donor initiator (metaphosphoric acid or quinoline hydrochloride), the reaction proceeded at  $250^\circ C$ . The products after purification are powders the color of which changes from red to black with increasing temperature and reaction time. Elemental analysis and IR spectroscopy suggest that structures of the following type are formed



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L 10376-65

ACCESSION ER: AP4047208



The polymer yield as a function of time tends to a maximum dependent on temperature. This was interpreted in terms of the establishment of a polymerization-depolymerization equilibrium. It was shown that the polymerization was autocatalytic in nature and was accelerated in the presence of a "seed" of previously prepared polyquinoline. The intrinsic viscosity of the polymer rose with polymerization time and at a given time, with increasing initiator concentration. At the same time, the unpaired spin concentration in the polyquinolines formed also rose. Orig. art. has: 5 formulas and 5 figures.

ASSOCIATION: Institut naftokhimiicheskogo sinteza AN BSSR imeni A. V. Topchiyeva (Institute of Petrochemical Synthesis, AN BSSR)

Card 2/3

L 10376-65

ACCESSION NR: AP4047208

SUBMITTED: 07Dec63

ATD PREBS: 3119

ENCL: 00

SUB CODE: 00, 00

NO REF BOV: 006

OTHER: 000

Card 3/3

L 12461-65 EWT(=)/EPF(c)/EPR/EMP(j)/I/EAP(v) PC-4/Pr-4/Pa-4 AFETH WH/RM

ACCESSION NR: AP4047212

S/0190/64/006/010/1832/1837

AUTHOR: Malinskiy, Yu. M.; Prokopenko, V. V.; Kargin, V. A.

TITLE: The nature of extremal dependence of the strength of adhesive bonds and polymeric materials on the temperature and deformation rate

SOURCE: Vyssokomolekulyarnyye soyedineniya, v. 6, no. 10, 1964, 1832-1837

TOPIC TAGS: adhesive, polyvinyl acetate, adhesive bond strength

ABSTRACT: A study has been made of the effect of the loading rate and adhesive-film thickness on the temperature dependence of adhesive bond strength (ABS). The ABS tests were carried out by a previously described method with glass-poly(vinyl acetate) or corundum-filled poly(vinyl acetate) or BF-4<sup>2</sup> glass specimens (BF-4 is a phenol-formaldehyde-poly(vinyl butyral) resin). ABS versus temperature curves showed a maximum near the glass transition temperature ( $T_g$ ). An increase in the loading rate shifted the temperature ( $T_{max}$ ) of maximum ABS upward. This was in good agreement with published data on  $T_g$  versus loading rate, confirming the role of relaxation, which determines  $T_g$ , in the ABS rise in the vicinity of  $T_g$ . A decrease in the adhesive-film thickness also shifted  $T_{max}$  upward. The observed

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L 12461-65

ACCESSION NR: AP4047212

extremal temperature dependence of ABS was attributed to nonuniform stress distribution in the seam; this was thought to hold true in general for polymeric adhesives exhibiting adhesive or cohesive failure. Such nonuniformity may be due to partial crystallization, filler, a cut in the specimen, specimen shape, or loading conditions. Orig. art. has: 7 figures.

ASSOCIATION: Fiziko-khimicheskiy institut in. L. Ya. Karpova (Physicochemical Institute)

SUBMITTED: 09Dec63

ATD PRESS: 3123

ENCL: 00

SUB CODE: GC, MT

NO REP SOV: 015

OTHER: 005

Card 2/2

1.11352-65 KPA(s)-2/EWT(m)/EPF(c)/EWP(j)/T Pc-4/Pr-4/Pt-10 RPL/ASD(a)-5/  
AFETR/ESD(t)/ASD(m)-3/Pa-4/ESD(dp)/APWL RM

ACCESSION NR: AP4047216

8/0190/64/006/010/1852/1861

AUTHOR: Kabanov, V. A.; Kargin, V. A.; Kovalava, V. P.;  
Topchiyev, D. A.

TITLE: The kinetics and mechanism of polymerization of aromatic heterocyclic compounds

SOURCE: Vyssokomolekulyarnyye soedineniya, v. 6, no. 10, 1964, 1852-1861

TOPIC TAGS: aromatic heterocyclic compound, polymerization, pyridine, quinoline, organic semiconductor, semiconductivity polymer, polyquinoline, polypyridine

ABSTRACT: A study has been made of the kinetics and mechanism of polymerization of aromatic heterocyclic compounds as exemplified by pyridine and quinoline. A kinetic scheme has been proposed for autocatalytic polymerization which takes into account the reversibility of propagation, resulting in the establishment of a polymerization-depolymerization equilibrium in the system. Kinetic equations were devised which are in good agreement with the principal laws governing

Card 1/2

L 11352-65

ACCESSION NR: AP4047216

pyridine and quinoline polymerization in stoichiometric complexes with  $ZnCl_2$ . A polymerization mechanism is proposed for aromatic nitrogen-containing heterocyclic compounds, and the role of the complexing agents is discussed. By binding the unshared electron pair of the nitrogen atom, the complexing agent increases the polarisation of the N—C bond in the ring and facilitates ring cleavage by a proton to form a conjugated carbonium ion. Propagation proceeds by the successive addition of monomer molecules to this ion. Orig. art. has 32 formulas, 1 table, and 4 figures.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova (Moscow State University)

SUBMITTED: 16Dec63

ATD PRESS: 3118

ENCL: 00

SUB CODE: GC

NO REF SOV: 009

OTHER: 001

Card 2/2

L 16374-65 EWT(m)/EPF(c)/EWP(j)/T Pc-4/Pr-4 ASD(m)-3 RM

ACCESSION NR: AP4049149

S/0190/64/006/011/1955/1958

AUTHOR: Paleyev, O. A.; Kocheshkov, K. A.; Kargin, V. A.; Sogolova, T. I.;  
Ly\*chkova, V. F.

TITLE: Effect of the degree of dispersion of the organometallic component of a mixed catalyst on the polymerization of ethylene

SOURCE: Vy\*sokomolekulyarny\*ye soyedineniya, v. 6, no. 11, 1964, 1955-1958

TOPIC TAGS: polyethylene, polymerization catalyst, organometallic catalyst, hexane, phenyl lithium, butyl lithium, ethyl lithium, mixed catalyst, catalyst particle size, ethylene polymerization

ABSTRACT: The dependence of the polymerization and properties of polyethylene on the chemical composition and degree of dispersion of the organometallic component of the mixed catalyst was investigated. The mixed catalyst was prepared in the same manner in all cases: ethylene-saturated n-hexane; ratio of  $RLi:TiCl_4=1:1$ , careful stirring, temperature of  $-60$  to  $-70^\circ C$ . The solid organometallic component  $C_6H_5Li$  of varying particle size was prepared by the double decomposition of  $C_6H_5Br$  and alkyl-Li in various media. The degree of dispersion was estimated by visual observation under the microscope and also

Card

1/3

L 16374-65

ACCESSION NR: AP4049149

by comparing the infrared spectra of pure crystalline compounds. The micrographs showing the spherulitic structure of polyethylene indicate that the polymer reflects, to a certain extent, the form of the undissolved crystallites of the organometallic component. The difference in the size of the polyethylene spherulites is not greater than 1.6:1 according to the type of phenyl-Li used, and this does not affect the mechanical properties. The rate of ethylene absorption (maximum at 0-30°C) and the yield of polymer (maximum = 2500 g/g equiv. with phenyl-Li made from bromobenzene and n-butyl lithium in hexane) were found to be directly related to the dispersion of the organometallic compound in the medium. The infrared spectra of phenyl-lithium samples (four types) showed almost complete identity. The intensity of the band varied slightly only over the range 900-1100  $\text{cm}^{-1}$ , due usually to the deformation oscillation of the C-H bonds in the monosubstituted benzene depending on the method of preparation. Although this variation in intensity is not great, on the basis of it a difference in the packing and structure of the crystals can be assumed, which limits the movement of the C-H group in the molecule. The mechanical properties of polyethylene do not depend on the dispersion of the catalyst component, but do depend on the chemical composition of the catalyst. "The authors express their gratitude to T. V. Talalayeva and A. N. Rodinov for their valuable suggestions and assistance in this work." Orig. art. has: 4 figures and 1 table.

Card

2/3

L 16374-65

ACCESSION NR: AP4049149

ASSOCIATION: Fiziko-khimichesky Institut im. L. Ya. Karpova (Physicochemical  
institute)

SUBMITTED: 28Dec63

ENCL: 00

SUB CODE: OC, *LC*

NO REF SOV: 000

OTHER: 000

Card

3/3

L 15172-65 EPA(s)-2/EWT(m)/EFF(c)/EPR/EWP(j)/T Pc-4/Pr-4/Ps-4/Pt-10/Pa-4  
 WW/RM

ACCESSION NR: AP4049151

S/0190/64/006/011/1974/1979

AUTHOR: Slovkhotova, N. A.; Magrupov, M. A.; Kargin, V. A.

TITLE: Thermal degradation of polyethylene

SOURCE: Vyssokomolekulyarnyye soyedineniya, v. 6, no. 11, 1964, 1974-1979

TOPIC TAGS: polyethylene, low pressure polyethylene, high pressure polyethylene, polyethylene thermal degradation, polyethylene pyrolysis, thermal degradation mechanism

ABSTRACT: To resolve a controversy over the mechanism of the pyrolysis of polyethylene, thermal degradation of high- and low-pressure polyethylene (HDPE and LDPE) at 325—415C was investigated under vacuum in a closed system, and with the removal of volatiles from the reaction space. The method of pyrolysis was described previously. The molecular weights of the starting and end products were calculated; those of the volatile fractions were determined cryoscopically. An IR spectral analysis of the degradation products showed that when the reaction is carried out in the closed system at 360C and higher, secondary reactions

Card 1/2

L 15172-65

ACCESSION NR: AP4049151

between the pyrolysis products leading to an increase in trans-vinylene and a decrease in vinyl unsaturation become important. The increase in the relative number of trans-vinylene double bonds in the PE pyrolysis products is not in accord with the scheme of formation of such bonds in the degradation of the polymeric chain at the free-radical center close to the branching node of the chain. It is suggested that trans-vinylene double bonds are formed as a result of the migration of end double bonds to the middle of the chain, and also of the intramolecular encounter of two free-radical centers. It was found that in PE, inorganic impurities acting as catalysts of migration of the double bond and of the radical center affect the distribution of the unsaturation in its thermal degradation products. The reason for the higher thermal resistance of LPPE as compared to HPPE is discussed. Orig. art. has: 3 tables and 4 formulae.

ASSOCIATION: Fiziko-khimicheskiy institut im. L. Ya. Karpova (Physico-chemical Institute)

SUBMITTED: 07Jan64

ENCL: 00

SUB CODE: OG, GC

NO REF SOV: 004  
Card 2/2

OTHER: 005

ATD PRESS: 3139

L 16325-65 EWT(m)/EPF(c)/EPR/ENP(j)/I Pc-A/Pr-4/PS-4 RPL/ESD(95)/  
ESD(t)/ASD(m)-3 WH/RM  
ACCESSION NR: AP4049155 S/0190/64/006/011/2040/2045

AUTHOR: Kargin, V. A.; Plate, N. A.; Patrikeyeva, T. I.

TITLE: Copolymerization of potassium acrylate and acrylamide under heterogeneous conditions

SOURCE: Vy\*sokomolekulyarny\*ye soyedineniya, v. 6, no. 11, 1964, 2040-2045

TOPIC TAGS: potassium acrylate, acrylamide, copolymerization, acrylic copolymer, magnesium peroxide, hydrogen peroxide, lead chromate, hydrogen epoxide, polymerization initiator, heterogeneous polymerization, polymerization catalyst, ultraviolet light

ABSTRACT: The copolymerization of potassium acrylate and acrylamide in aqueous solutions induced by an insoluble radical initiator was investigated. A study of the peculiarities of the polymerization of acrylic monomers under heterogeneous conditions showed that the solid surface of the catalyst adsorbing the monomer molecules and initiating the polymerization has a regulating effect on the elementary reaction of chain growth. Water-insoluble inorganic peroxides and salts capable of redox reactions with the formation of free radicals were used as heterogeneous catalysts and water-soluble acrylamide and acrylates were used as monomers. The experimental procedure is described. The tabulated data

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on copolymerization of potassium acrylate and acrylamide (1:4 by weight) with different initiators, such as magnesium peroxide, hydrogen peroxide in the presence of magnesium oxide, a redox system of lead chromate and sodium thiosulfate hydrogen epoxide, or ultra-violet light show that the copolymer contains a larger amount of acrylate (by 10%) than after homogeneous polymerization, while the results agree well for the three different heterogeneous and homogeneous systems. This shows the independence of the composition of the copolymer of the type of initiator under the conditions of the same reaction mechanism and equilibrium constants of copolymerization. Other experiments with hydrogen peroxide over magnesium oxide also confirmed that the peculiarities of the copolymerization under heterogeneous conditions are correlated with the effect of the solid surface of the catalyst on chain propagation rather than with its initiating effect. The copolymerization of potassium acrylate and acrylamide in the presence of potassium propionate showed that potassium propionate is adsorbed onto the magnesium oxide, removes the acrylate from the surface of the latter and affects the composition of the copolymer. During the copolymerization of potassium acrylate and acrylamide under homogeneous and heterogeneous conditions, the equivalent values of the copolymerization constants  $r_1$  and  $r_2$  vary. They are 1.35 and 0.78 (in the heterogeneous process) or 0.84 and 1.4 (in the homogeneous process). This leads to copolymers of different chemical composition from the same

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mixture of monomers. The potentiometric titration curves of saponified copolymers of potassium acrylate and acrylamide of the same composition obtained under homogeneous and heterogeneous conditions show that the dissociation constants (pK) of the acids for the copolymers obtained under different conditions have different values. For heterogeneous copolymerization:  $pK = 4.4597$ ; for homogeneous copolymerization,  $pK = 4.2760$ , i.e.  $\Delta pK$  is equal to 0.1837. The same conclusions as to the different structure of the chains can be drawn from the specific viscosity of the two types of polymer solutions plotted against the pH of the medium. The regulating effect of the heterogeneous catalyst leads to the formation of copolymers which have a different chain microstructure than the copolymers of the same chemical composition, but obtained under homogeneous conditions. Orig. art. has: 3 tables, 4 figures and 3 formulas.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova  
(Moscow State University)

SUBMITTED: 24Jan64

ENCL: 00

SUB CODE: OC

NO REF SOV: 003

OTHER: 000

Card 3/3

L 15997-65 EWT(m)/EPF(c)/ENP(j)/T Pc-4/Pr-4 AFWL/ASD(a)-5/ASD(m)-3  
ACCESSION NR: AP4049160 RM S/0190/64/006/011/2090/2092

AUTHOR: Kargin, V. A.; Sogolova, T. I.; Rapoport-Molodtsova, N. Ya.

TITLE: Effect of the size and geometric form of heterogeneous crystallization nuclei on the supramolecular structure of crystalline polymers

SOURCE: Vy\*sokomolekulyarny\*ye soyedineniya, v. 6, no. 11, 1964, 2090-2092

TOPIC TAGS: polymer, gutta-percha, isotactic polystyrene, crystallization, heterogeneous nucleation nucleus

ABSTRACT: In earlier studies the authors have shown that the artificial introduction of heterogeneous crystallization nuclei into crystallizing polymers is an effective method for controlling their supramolecular structures and, thereby, their mechanical properties (Dokl. AN SSSR, 156, 1156, 1964; Dokl. AN SSSR, 156, 1406, 1964). This study deals with the effect of the form, size, and number of these nuclei on the structure of gutta-percha and isotactic polystyrene films. Organic substances which do not react with the polymer and

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ACCESSION NR: AP4049160

whose melting point is higher than that of the polymer (such as indigo, salicylic acid, hexachlorobenzene, or anthracene in the case of gutta-percha, and indigo or alizarin in the case of isotactic polystyrene) were used as heterogeneous crystallization nuclei. The polymers were mixed with the nuclei in a common solvent and crystallized from melts or solutions. Study of the polymer structures by optical microscopy showed that the size of supramolecular structures in the polymers is determined by the size and number of nuclei, but the nature of supramolecular structures is determined by the geometric form of the nuclei. Orig. art. has: 6 figures.

ASSOCIATION: Fiziko-khimicheskiy institut im. L. Ya. Karpova  
(Physicochemical Institute)

SUBMITTED: 25Feb64

ENCL: 00

SUB CODE: GC, OC

NO REF SOV: 008

OTHER: 004

ATD PRESS: 3146

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L 25101-65 ENG(j)/EWI(m)/EPF(c)/EPF(n)-2/EPR/EWP(j)/I/EWA(h)/EWA(i) Pc-4/  
Pr-4/Ps-4/Peb/Pi-4/Pu-4 RPL RWH/WH/GG/RM

ACCESSION NR: AP5001764

S/0063/64/009/006/0602/0619

AUTHOR: Kargin, V. A. (Academician); Kabanov, V. A. (Candidate of chemical sciences)

TITLE: Polymerization in structured systems

SOURCE: Vsesoyuznoye khimicheskoye obshchestvo. Zhurnal, v. 9, no. 6, 1964, 602-619

TOPIC TAGS: structured polymer system, vapor condensation polymerization, polymerization kinetics, reactive polymer center, polymer crystalline lattice

ABSTRACT: Some aspects of polymerization in solid systems are surveyed, referring to radiation-induced, photochemical, thermal, mechanical polymerization and the simultaneous condensation of monomer and inorganic initiator vapors under vacuum on the deeply cooled container walls. In the last case, discussed in more detail, reactive centers for selective polymerization are formed in the excess monomer. This process has great advantages because of its selectivity in respect to the initiator, and the condensation temperature and the avoidance of undesirable side products in the system. Polymerization kinetics and its relation

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ACCESSION NR: AP5001764

to the phase in the crystalline monomer structure is figured for the various ratios of activation energy of the initial reaction rate to that of the appearance of centers of the new phase and of their growth. Further growth of a center of the new phase depends on its exceeding some critical value of size and is determined by the equation for volume and surface free energy of formation (supercritical center). The relationship between size of the supercritical center and the specific polymer chain developing from this center is discussed and its mathematic formula given. Two groups may be distinguished in respect to the character of polymerization. The first comprises systems whose crystalline lattice is so constructed that formation of macromolecules would require considerable displacement of the monomer molecules from the equilibrium locations in the lattice; in such cases polymerization will start from essentially separate centers unrelated to the crystals and preferably at their boundaries. This may be temperature-dependent and is visualized by normally ascending or S curves. The second group is characterized in that the geometric parameters of their crystal lattices are related to those of the forming macromolecules. Here polymerization encounters little strain and may be slowed mainly by the number of incomplete initial crystals. In polymeri-

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zation by vapor cooling (see above, e. g. acrylonitrile<sup>1</sup> at -160 to -130 C) the polymerization rate is limited by the rate of phase transformation, depending mainly on crystal formation of the glass-forming layer. Examples are cited showing the influence of the crystal lattice on the structure and orientation of the macromolecules in the structured system polymerization, e. g. freezing vapors of dioxane with magnesium at a temperature 1.5-2 C below the melting temperature will result in formation of the crystalline polyester while above the melting temperature poly- $\beta$ -ketone will be obtained. The most favorable conditions for the influence of the crystal lattice on the macromolecular structure will be obtained under conditions of polymer chain formation with lattice coherence. The crystal lattice would in this case assume the function of a matrix. The effect of the properties of the interphase boundary resembles that of stereospecific heterogeneous catalysis. The life of free ions or excited states is lengthened in the solid phase at low temperature; the mechanism and rate of elemental processes is determined by the orientation of each monomer molecule towards successful meeting with the active center, i. e. by the stock of labile molecules available and assumed to result in chain processes of macromolecule formation. The slow increase in

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molecular weight during post-polymerization of crystal line monomers may actually be related to the pulsating lengthening of the above-discussed macromolecules. This hypothesis seems to correlate satisfactorily with the general assumptions on the mechanisms of structural rearrangements and the formation of a new phase in crystalline bodies. Orig. art. has: 8 figures, 1 table and 16 formulas

ASSOCIATION: None

SUBMITTED: 00

ENCL: 00

SUB CODE: IC, CC, SS

NR REF SOV: 040

OTHER: 059

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